

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> :  B60B 33/06	A1	(11) International Publication Number: WO 92/19463  (43) International Publication Date: 12 November 1992 (12.11.92)
---	----	--

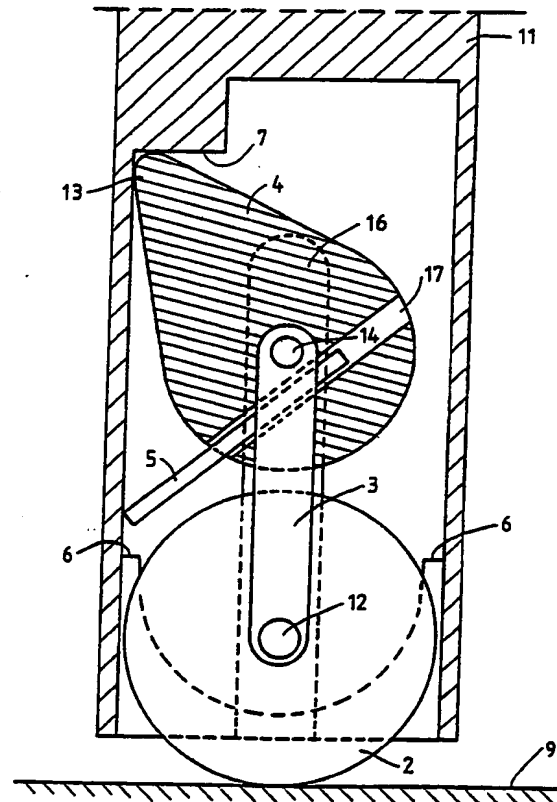
(21) International Application Number: PCT/FI92/00134  
(22) International Filing Date: 30 April 1992 (30.04.92)  
(30) Priority data:  
912083 30 April 1991 (30.04.91) FI  
(71)(72) Applicant and Inventor: KOSKELA, Hannu [FI/FI];  
Luostarinkatu 6, SF-26130 Rauma (FI).  
(74) Agent: TURUN PATENTTITOIMISTO OY; PL 99, SF-  
20521 Turku (FI).  
(81) Designated States: AT, AT (European patent), AU, BB, BE  
(European patent), BG, BR, CA, CH, CH (European patent),  
CS, DE, DE (European patent), DK, DK (European patent), ES, ES  
(European patent), FI, FR (European patent), GB, GB (European patent),  
GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU,  
LU (European patent), MC (European patent), MG, MN, MW, NL, NL  
(European patent), NO, PL, RO, RU, SD, SE, SE (European patent), US.

**Published**  
*With international search report.*  
*With amended claims.*  
*In English translation (filed in Finnish).*

(54) Title: WHEEL CONSTRUCTION

(57) Abstract

The object of the invention is a wheel mechanism, by means of which a wheel (2) can optionally be either extended or retracted, depending on whether the mechanism is wanted to be in a movable or stationary position in relation to the floor (9). The wheel mechanism relating to the invention includes means (3, 16), which allow a vertical movement of the wheel (2) when the mechanism is being lifted, and the mechanism also includes a locking device (4, 5, 7), which locks the wheel into the movable position every second time the mechanism is being lifted.



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	ES	Spain	MG	Madagascar
AU	Australia	FI	Finland	ML	Mali
BB	Barbados	FR	France	MN	Mongolia
BE	Belgium	GA	Gabon	MR	Mauritania
BF	Burkina Faso	GB	United Kingdom	MW	Malawi
BG	Bulgaria	GN	Guinea	NL	Netherlands
BJ	Benin	GR	Greece	NO	Norway
BR	Brazil	HU	Hungary	PL	Poland
CA	Canada	IT	Italy	RO	Romania
CF	Central African Republic	JP	Japan	RU	Russian Federation
CG	Congo	KP	Democratic People's Republic of Korea	SD	Sudan
CH	Switzerland	KR	Republic of Korea	SE	Sweden
CI	Côte d'Ivoire	LI	Liechtenstein	SN	Senegal
CM	Cameroon	LK	Sri Lanka	SU	Soviet Union
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
DE	Germany	MC	Monaco	TG	Togo
DK	Denmark			US	United States of America

## WHEEL CONSTRUCTION

The invention relates to a wheel mechanism, by means of which the wheel can optionally be extended or retracted, depending on whether the mechanism is wanted to be in a movable or stationary position, in relation to the base.

- 5 Devices like this facilitate, e.g. in homes and workshops, the movement of articles which have to stand steadily in their place while being used. The transporting means are taken into operative engagement only when the articles have to be moved.
- 10 Movable articles are known to be fitted with wheels which can be locked when necessary. Thus the article stays in its position, but can also be moved when needed. E.g. refrigerators, freezers, washing machines, stoves; 3-piece suits, cabinets etc. are typical examples of such articles
- 15 in homes. Especially household machines need to be moved occasionally, i.a. for cleaning. They are, however, difficult to move and so maintenance and cleaning may easily be neglected. This may result in the machine breaking down or becoming dirty to such an extent as to
- 20 cause e.g. a risk of fire.

If household machines are equipped with or partially equipped with fixed wheels, the problem of the machines moving accidentally remains. Locking wheels cannot, on the other hand, be used in machines inserted into e.g. kitchen

25 furnishing.

One solution to the problem described above has been presented in US patent publication 2,524,819. The disadvantage of this solution is, however, that a separate tool is needed to make an article mounted on wheels

30 movable. Thus each leg of the article must be separately made operative by means of a special tool, the use of which requires a large sideways clearance.

It is an object of this invention to eliminate the above-mentioned problems, and to provide a new device, which does not have above mentioned disadvantages.

The invention is characterized in that the wheel mechanism  
5 comprises means for allowing a vertical movement of the wheel when the mechanism is being lifted, and that the mechanism comprises a locking device, which locks the wheel into a movable position at every second lift of the mechanism.

10 The operation of a wheel, necessary for the movement of articles is made automatic by means of the invention. When e.g. an article, standing steadily on its legs, needs to be moved, it only has to be lifted enough for the wheel to be extended and to get locked into a movable position. When,  
15 after being moved, the article is wanted to stand steadily again in a stationary position, it is only necessary to lift the wheel mechanism for a second time for the wheel to be retracted.

The invention offers a particularly favorable solution e.g.  
20 in a case when a freezer located in a narrow space has to be moved temporarily.

The invention is described in the following with an example, with reference to the appended drawings, in which

25 Figures 1 to 4 show the stages of how to change a cupboard, fitted with wheel mechanisms in accordance with the invention, into a movable position.

Figure 5 shows a cross-section of the wheel mechanism of the invention.

30 Figures 6 to 10 show the stages of how to bring the mechanism in figure 5 into operative condition.

Figures 11 to 15 correspond to figures 6 to 10 and show the stages of how to return the mechanism into a

non-operative state.

Figure 1 illustrates any cupboard 10, difficult to move and located in a narrow space e.g. a freezer, difficult to move, when placed in a niche and standing on the floor 9.

- 5 The cupboard 10, when fitted with the wheel mechanisms relating to the invention, can however be made easily movable by tilting it.

To bring the cupboard 10 into a movable position, it must first be tilted, as seen in figure 2, e.g. by pushing the  
10 top part. The cupboard will tilt backwards on the rear legs 1, and the front legs will raise up from the floor. Now the mechanisms in the front legs will extend the wheels 2 therein. When the tilting on the rear legs is ended and the article is lowered back onto the floor 9, the front leg  
15 wheels 2 will remain in an operative position.

Next, the cupboard 10 is tilted in the opposite direction, as seen in figure 3, the front legs, standing on wheels 2, acting as support points. This can be done by holding the cupboard in its position by means of a foot 8, and by  
20 simultaneously tilting it forward against oneself. When the rear legs have been raised up from the floor, their wheels 2 will be extended into an operative position and get locked. When the cupboard 10 is now extended back on its legs, it will be in a movable condition with all wheels 2  
25 lowered, as can be seen in figure 4.

To bring the cupboard 10 back into the stationary position of figure 1, the procedure is reversed. First the cupboard 10 is held in position by means of a foot and its top is tilted forward against oneself, as seen in figure 3,  
30 whereby the rear legs including wheels will be raised clear of the floor. When the cupboard 10 is lowered again onto the floor 9, the wheels 2 will be retracted inside the legs 1.

Further, the top of the cupboard is tilted backward, as shown in figure 2, whereby the front wheels are raised up from the floor. When the front of the cupboard is lowered onto the floor, also the front wheels 2 will retract inside  
5 the front legs 1.

Changing the position of a freezer, fitted with a wheel construction of the invention, and moving it back again has been described above. The mechanism relating to the invention operates in a similar way also in other articles  
10 which need to be easily moved and which, on the other hand, have to stand steadily in their places. Thus, to make e.g. a sofa, a cabinet, or a washing machine movable, it is only necessary to tilt the article from each end in turn, in order to extend the wheels. Making the article stationary  
15 again is done similarly, by raising the necessary legs, by turns, clear of the floor.

Figure 5 shows a cross section of the wheel mechanism relating to the invention. The mechanism includes a wheel 2, located inside a frame 11. A spindle 12 joins the wheel  
20 through a bearing to the bottom end of a connecting piece 3. A swinging cam 4 is attached to the opposite end of the connecting piece 3 by means of another spindle 14. The wheel unit, consisting of the connecting piece 3, the wheel 2, and the cam 4, is movable up and down in a duct 16  
25 inside a frame 11. Furthermore, inside the cam 4 there is a slot 17, in which a slide 5 is able to move freely. The slide 5 acts by turning the cam alternately from side to side.

Figure 5 shows the mechanism in the position with the wheel  
30 2 supported against the floor 9. Then, as seen in the picture, the swinging cam 4 is tilted to the left and a tip 13 of the cam rests against a support point 7 of the frame 11. The slide 5 in the slot 17 inside the cam has freely dropped against the wall of the frame 11. When the whole  
35 mechanism is lifted upwards, the slide 5 will turn the tip

13 of the cam 4 to the opposite side and the wheel 2 will be retracted inside the frame. The operation is shown more clearly, stage by stage, in the following figures.

In figure 6, the wheel mechanism is inside the frame of the leg 1, and the leg of the cupboard is standing steadily in its position on the floor 9.

In figure 7 the mechanism has been raised enough to allow gravitation to move a little downwards the combination inside the leg: the wheel 2, the connecting piece 3, and the cam 4. With further raising of the mechanism, the slide 5 inside the cam 4 will touch the lower shoulder 6 in the frame. Now the slide begins to turn the tip 13 of the cam 4 to the opposite side. Figure 8 shows the cam 4 turned into the vertical position.

In figure 8 the mechanism has been raised further, enough for the wheel 2 to be lifted clear of the floor 9, and the tip 13 of the cam 4 has swung to the opposite side. When the leg of the cupboard is brought back onto the floor, the tip 13 of the cam 4 will meet the support shoulder 7 of the frame 11, and the wheel 2 will remain partially visible. It is now possible to move the cupboard by means of the wheel 2.

Making the wheel mechanism stationary again is done in a reversed order. When the leg is raised from the position seen in figure 11, the wheel 2 will be pushed downward and the end of the slide 5 will meet the lower shoulder 6. Figure 12 shows that now the tip 13 of the cam 4 begins to turn to the right. When the wheel 12 is hanging in its downmost position, as seen in figure 13, the cam 4 has been turned to the right. When the mechanism is lowered back onto the floor 9, the cam 4 will rise, as seen in figure 14. In this position the cam 4 is able to rise high enough for the wheel 2 to be completely retracted into the frame 11.

It is obvious to one skilled in the art that the different embodiments of the invention may vary within the scope of the claims presented below.



## CLAIMS

1. A wheel mechanism, by means of which a wheel (2) can optionally either be extended or retracted, depending on whether the mechanism is wanted to be in the movable or stationary position in relation to the base (9),  
5 characterized in that the wheel mechanism includes a component (3, 16), which allows a vertical movement of the wheel (2) when the mechanism is being lifted, and that the mechanism comprises a locking device (4, 5, 7), which locks the wheel into a movable position every second time the  
10 mechanism is being lifted.
2. A wheel mechanism as claimed in claim 1, characterized in that the locking device comprises a cam (4) attached to the wheel (2) by a connecting piece (3), and a slide (5) attached to the cam, which slide turns the cam to the  
15 opposite side after each lift of the mechanism.
3. A wheel mechanism as claimed in claim 1 or 2, characterized in that a top shoulder (7) is arranged on one side of a frame (11) of the mechanism, against which the tip (13) of the cam (4) is supported after every second  
20 lift.
4. A wheel mechanism as claimed in claim 1, 2 or 3, characterized in that a freely moving slide (5) is arranged in a slot (17) inside the cam (4), and that the end of the slide touches a lower shoulder (6) in the frame (11), when  
25 the wheel (2) moves downward, in order to turn the tip (13) of the cam to the opposite side.

## AMENDED CLAIMS

[received by the International Bureau on 24 September 1992 (24.09.92);  
original claim 1 amended; remaining claims unchanged (1 page )]

1. A wheel mechanism, by means of which a wheel (2) can optionally either be extended or retracted, depending on whether the mechanism is wanted to be in the movable or stationary position in relation to the base (9), wherein  
5 the wheel mechanism includes a component (3, 16), which allows a vertical movement of the wheel (2) when the mechanism is being lifted, characterized in that the mechanism comprises a locking device (4, 5, 7), which locks the wheel into a movable position compulsively under the  
10 influence of gravity every second time the mechanism is being lifted.

2. A wheel mechanism as claimed in claim 1, characterized in that the locking device comprises a cam (4) attached to the wheel (2) by a connecting piece (3), and a slide (5)  
15 attached to the cam, which slide turns the cam to the opposite side after each lift of the mechanism.

3. A wheel mechanism as claimed in claim 1 or 2, characterized in that a top shoulder (7) is arranged on one side of a frame (11) of the mechanism, against which the  
20 tip (13) of the cam (4) is supported after every second lift.

4. A wheel mechanism as claimed in claim 1, 2 or 3, characterized in that a freely moving slide (5) is arranged in a slot (17) inside the cam (4), and that the end of the  
25 slide touches a lower shoulder (6) in the frame (11), when the wheel (2) moves downward, in order to turn the tip (13) of the cam to the opposite side.

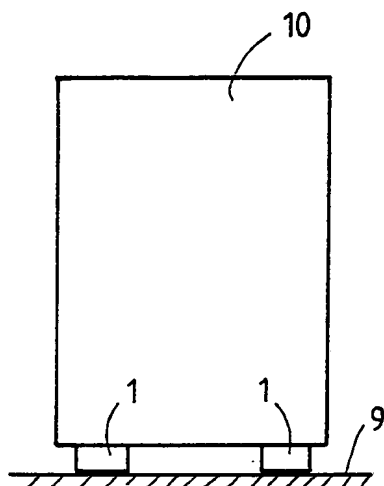


FIG. 1

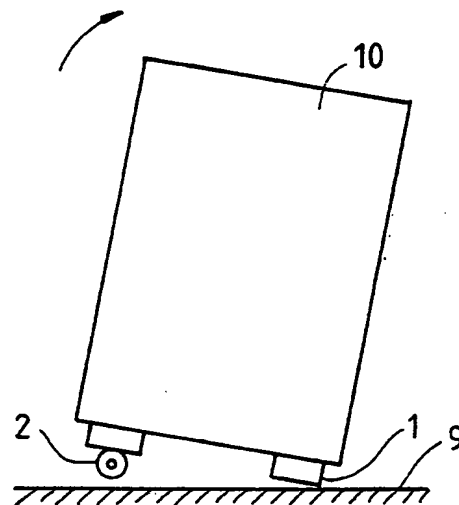


FIG. 2

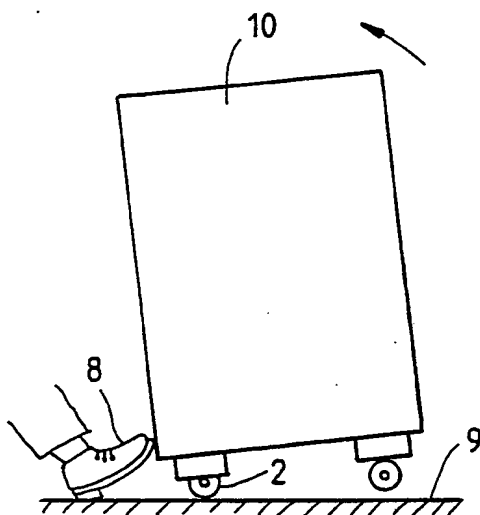


FIG. 3

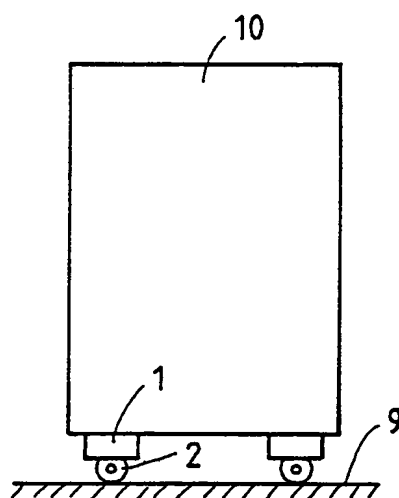


FIG. 4



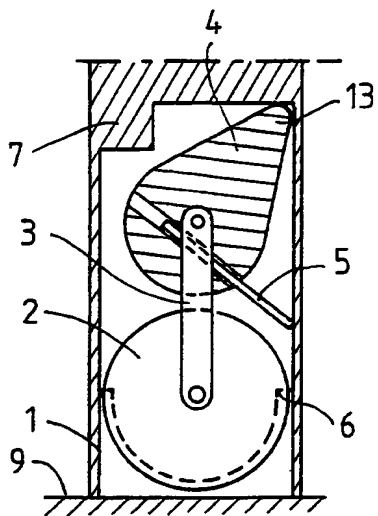


FIG. 6

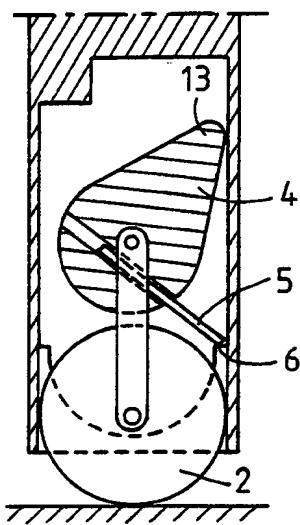


FIG. 7

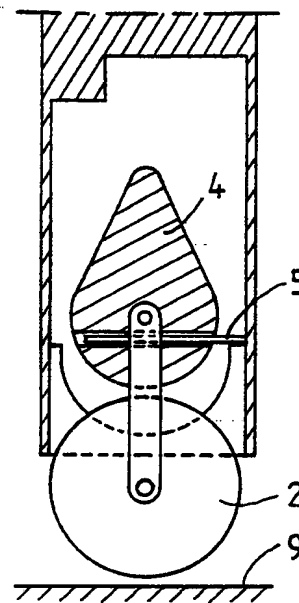


FIG. 8

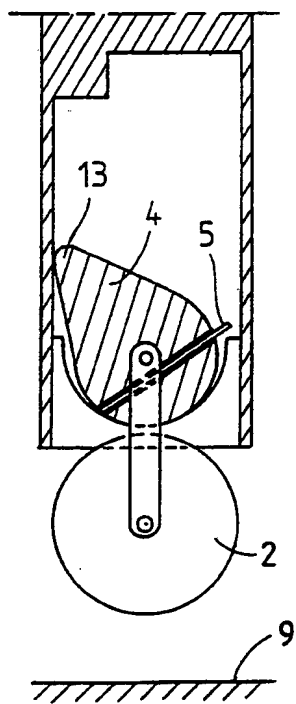


FIG. 9

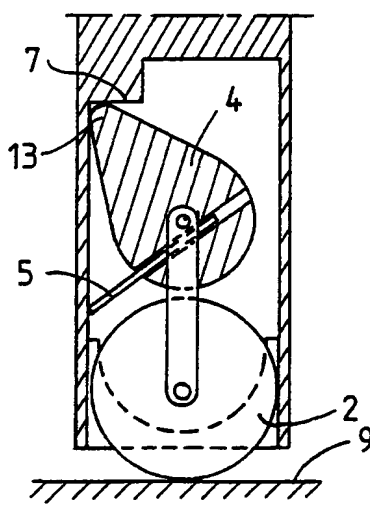


FIG. 10

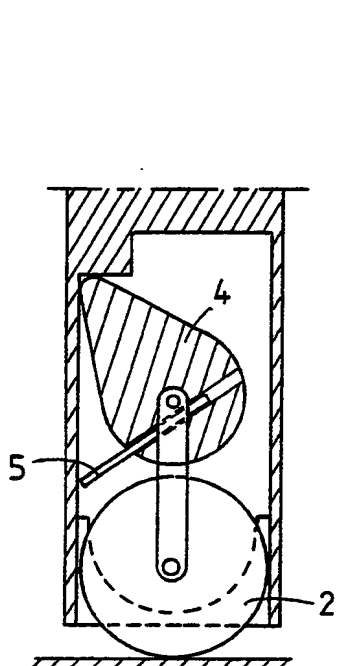


FIG. 11

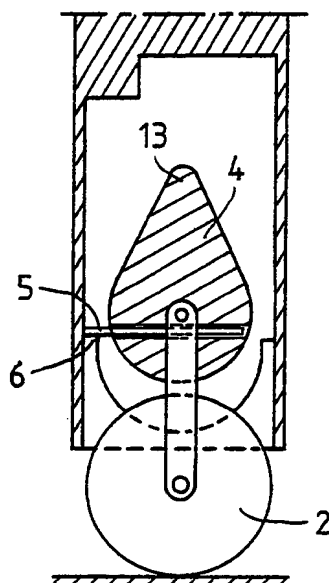


FIG. 12

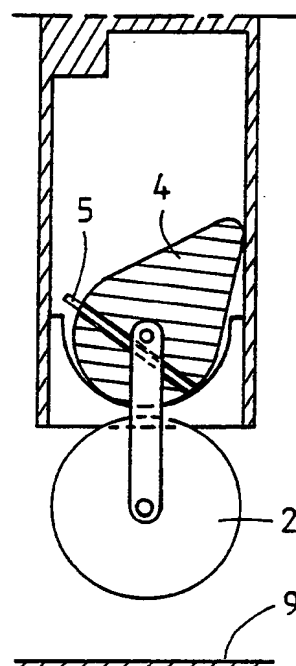


FIG. 13

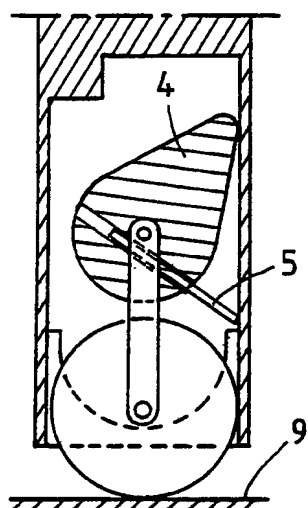


FIG. 14

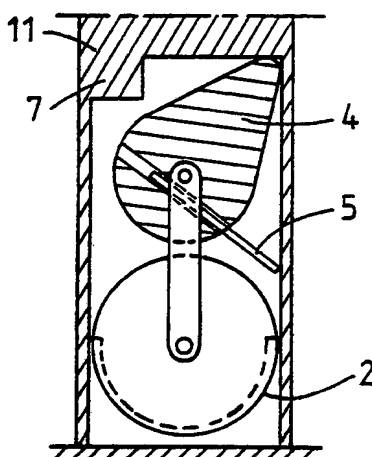


FIG. 15

# INTERNATIONAL SEARCH REPORT

International Application No PCT/FI 92/00134

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC5: B 60 B 33/06</b>											
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched<sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC5</td> <td style="padding: 5px;">B 60 B</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched<sup>8</sup></div> <p style="padding: 5px;">SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	B 60 B					
Classification System	Classification Symbols										
IPC5	B 60 B										
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category *</th> <th style="width: 60%; padding: 5px;">Citation of Document,<sup>11</sup> with indication, where appropriate, of the relevant passages<sup>12</sup></th> <th style="width: 30%; padding: 5px;">Relevant to Claim No.<sup>13</sup></th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">EP, A2, 0153832 (KEIL, FREDERICK JOHN) 4 September 1985, see the whole document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 4008507 (SMITH) 22 February 1977, see the whole document -- -----</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> </tbody> </table>			Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	X	EP, A2, 0153832 (KEIL, FREDERICK JOHN) 4 September 1985, see the whole document --	1	X	US, A, 4008507 (SMITH) 22 February 1977, see the whole document -- -----	1
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>									
X	EP, A2, 0153832 (KEIL, FREDERICK JOHN) 4 September 1985, see the whole document --	1									
X	US, A, 4008507 (SMITH) 22 February 1977, see the whole document -- -----	1									
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>* Special categories of cited documents:<sup>10</sup></b></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Z" document member of the same patent family</p> </div> </div>											
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;">           Date of the Actual Completion of the International Search   <b>2nd July 1992</b> </td> <td style="width: 50%; padding: 5px; vertical-align: top;">           Date of Mailing of this International Search Report   <b>1992-07-24</b> </td> </tr> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;">           International Searching Authority   <div style="text-align: center;"><b>SWEDISH PATENT OFFICE</b></div> </td> <td style="width: 50%; padding: 5px; vertical-align: top;">           Signature of Authorized Officer  <b>Göran Carlström</b> </td> </tr> </table>			Date of the Actual Completion of the International Search  <b>2nd July 1992</b>	Date of Mailing of this International Search Report  <b>1992-07-24</b>	International Searching Authority  <div style="text-align: center;"><b>SWEDISH PATENT OFFICE</b></div>	Signature of Authorized Officer <b>Göran Carlström</b>					
Date of the Actual Completion of the International Search  <b>2nd July 1992</b>	Date of Mailing of this International Search Report  <b>1992-07-24</b>										
International Searching Authority  <div style="text-align: center;"><b>SWEDISH PATENT OFFICE</b></div>	Signature of Authorized Officer <b>Göran Carlström</b>										

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/FI 92/00134**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the Swedish Patent Office EDP file on 29/05/92  
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A2- 0153832	85-09-04	NONE	
US-A- 4008507	77-02-22	AU-D- 8787675 CA-A- 1032714	77-06-30 78-06-13